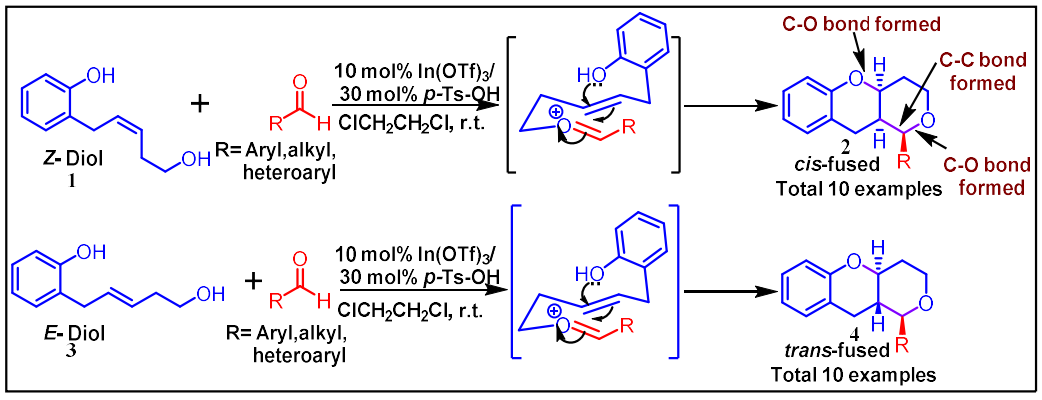
ABSTRACT

The thesis entitled **"*Stereoselective Synthesis of Five and Six Membered Oxa- and Aza- Heterocycles via Intramolecular Prins and Aza- Prins cyclization*"** has been divided into five chapters.

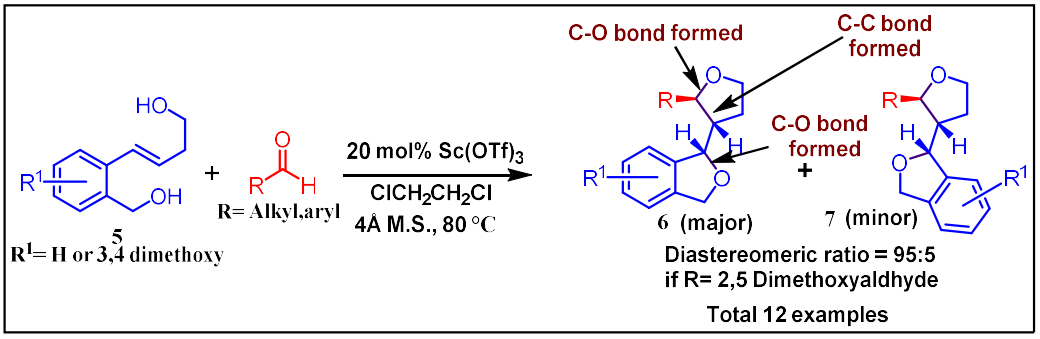
CHAPTER I: This chapter demonstrates a brief overview of the progress which has been made in the field of Prins and aza- Prins cyclization over the past few years. Many examples of their applications towards the synthesis of biologically attractive compounds have been discussed.

CHAPTER II: In this chapter we have described the coupling of (*Z*)-2-(5-hydroxypent-2-enyl)phenol **1** with various aldehydes in presence of 10 mol% $In(OTf)_3$ and 30 mol% *p*- TsOH at ambient temperature in 1,2-dichloroaethane solvent to produce the *cis*-fused hexahydropyrano [4,3-b]chromene **2** derivatives in good yields, where as the coupling of (*E*)-2-(5-hydroxypent2-enyl)phenol **3** with aldehydes under similar reaction conditions affords the corresponding *trans*-fused hexahydropyrano[4,3-b]chromene **4** derivatives.



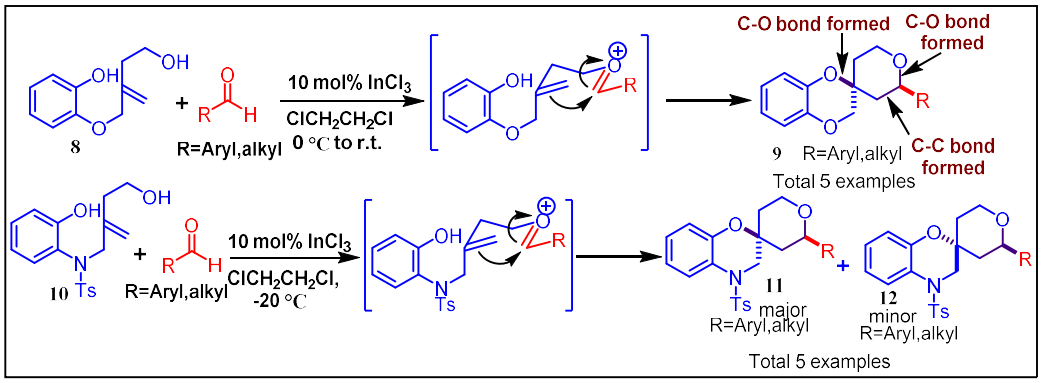
Scheme 1: Prins cyclization

CHAPTER III: In this chapter, the coupling of homoallylic alcohol bearing with a benzylic hydroxyl group i.e. (*E*)-4-(2-(hydroxymethyl) phenyl)but-3-en 1-ol **5** with aldehydes in the presence of 20 mol% $Sc(OTf)_3$ and 4Å M.S. at 80 °C afforded a novel series of 1-(tetrahydrofuran-3-yl)-1,3-dihydroisobenzofuran **6** & **7** derivatives in good yields with high diastereoselectivity *via* Prins cyclization has been disclosed.



Scheme 2: Prins cyclization

CHAPTER IV: In this chapter, we have describe the spirocyclization of 2-(4-hydroxy-2-methylenebutoxy)phenol **8** with aldehyde in presence

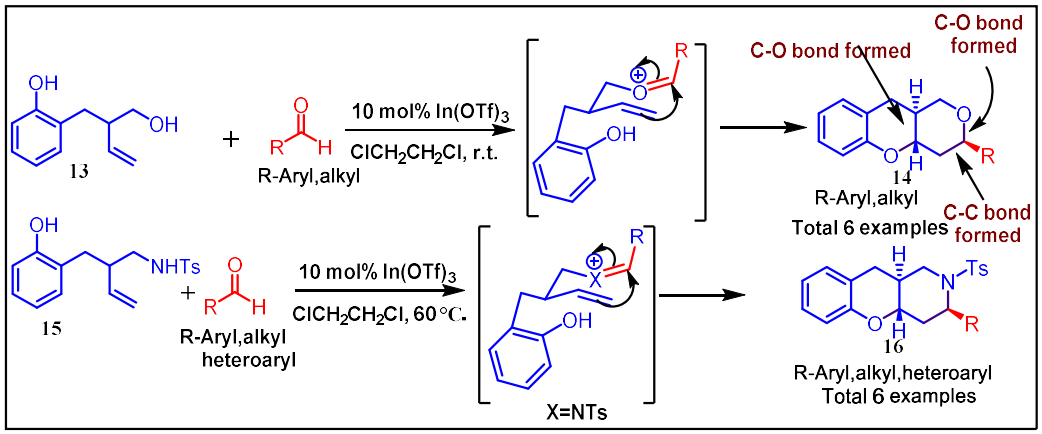


Scheme 3: Prins cyclization

of $InCl_3$ proceeds at r.t. with good yields and high diastereoselectivity to produce tetrahydro-3*H*-spiro[benzo[*b*][1,4]diox-ine-2,4'-pyran] motifs **9** whereas *N*-(hydoxy-2-methylenebutyl)-*N*-(2-hydroxyethyl)-4-

methylbenzenesulfonamide **10** with aldehydes requires -20 °C to afford hexahydospiro[benzo[*b*][1,4]oxazine -2,4'-pyran] derivatives **11** & **12** with good diastereoselectivity.

CHAPTER *V*: In this chapter, we deals the Prins cyclization of 2-(2-(hydroxymethyl)but-3-enyl)phenol **13** with aldehyde at room temperature in presence of 10% $In(OTf)_3$ to produce hexahydropyrano[4,3-b] chromene **14** derivatives with excellent yields whereas the coupling of *N*-(2-(2-hydroxybenzyl)but-3-enyl)-4-methyl-benzenesulfonamide **15** and aldehyde requires 60 °C to afford the corresponding hexahydrochromeno[3,2-c]pyridine **16** derivatives with good yields.



Scheme 4: Prins cyclization

In conclusion, we described the novel oxa-Prins and aza- Prins cyclization methods for the synthesis of different five and six membered fused oxa- and aza- heterocycles using different Lewis and Bronsted acids. The synthesized products are the core structural units of various natural and biologically active compounds.